

1606/96.

LETTER

From an OLD

PROCTOR

TO A

Young ONE, containing serious Advice for the conscientious and prudent Discharge of his Duty.

Together with Instructions, shewing how to view Tythe, so that, in his Valuation thereof, he may not injure either the Incumbent of the Parish, or the Parishioner out of whose Labour it ariseth.

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A

LETTER

TO

Mr. Patrick Toole Proctor, at Ballinderry in the County of Wicklow.

Dear P A D Y,

THE good Cleare, and kind Welcome which I met with at your House last Christmas, was so pleasing to me, that I shall not in haste, forget the Obligation but shall always endeavour to make what Return of Kindness I can, for your Love.

Amongst other Discourse, whilst I staid with you, I remember some Talk about the Business of Proctoring, and your telling me how your Minister's Proctor having, about the Beginning of last Harvest, run away with some of the Tythe-money

ou were put in his Place. You told me likewise
hat, by some Mistakes, for want of Skill and
Experience, in viewing and computing of the Quan-
tities of Lands, you had got much Anger from
both the Minister, and Farmers; and, before I
left your Country, made me promise to send you
some Directions for your help in that Business.-----
According to my Promise, I now send you, in Black
and White, such as I myself have made use of.

I formerly had these from Mr. John Thompson, who
had been a Scholar of Andrew Cumpstie's the Mathe-
matishon in Dublin, and was afterwards our Pa-
rish-School-Master.

He, at idle Times learn'd me *Rethmatick*, as far as
multiplying and dividing, and afterwards wrote out,
and bestow'd these Rules upon me as Helps to me
in my Business, I being then but a young *Proctor*;
and, for his Pains and Kindness, I gave him a pretty
little Bay Garran, together with a Bridle and Saddle,
all which had stood me in two and twenty Shillings
and six Pence; and I never since grudged the Ex-
pence. I have found them helpful in my viewings
of Lands, and, for thirty Years past, have made
good honest Bread thereby; and so, I hope, may
you.

I do not doubt but you will, from your Advantage
of them, be better able to afford your Friends as
good Meat and Drink the next *Christmas*, as you did
this last; and I wish it the rather, because my Wife
is ugly, who loves good Eating, and good Drinking,
as well as my own self does; resolves then to go a-
long with me, and to take care of what will be stir-
ring,



ing, especially your pure humming *Ballinderry*.
And now, my Lad, I shall, in a few Words, give you
some Advice.

First, In regard to your Master.

Secondly, To the Farmers.

Thirdly, To your self.

First, As to your Master: There are, I fear, too
many of our Calling, who make no Bones of tak-
ing Bribes to the hurt of their Masters.

On my Knowledge, I can tell you of one Man
who, for one Lamb to himself, return'd but ninety
Lambs in a Flock of a hundred: Another, who, for
the Grafs of a couple of Yearlings, made his Ma-
ster lose the Price of grazing half a Score. This
Man, has cut off 30 Shillings for a Pint of Whisky,
and that Man a couple of Crowns, even for a quart
or two of Ale.

I must own, that, when I first set out in Proctor-
ing, I my self did yield to two or three such Tempt-
ations; but my Master getting an inkling thereof
by the Farmers themselves, who are apt, either So-
ber or Drunk, to blab out such Matters, I, what with
his Reproaches on my Conscience, and what with
Threats of turning me off to starve with a poor Fa-
mily, was so concern'd, that I considered Matters
better, and so, as that I never since ventured to act
unfaithfully, or dishonestly to defraud him in any
Thing. I wou'd have you to do so too, or else you
will never be at quiet in your own Mind, nor thrive
in the World.

Secondly, As to the Parishioners, sometimes a
Proctor, out of ill Will against this, or that Far-
mer,

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mer, for some private Reasons of his own, does purposely and merely, out of Spite, over-value his Concerns, to vex and oppress him, and so to breed Disputes and Quarrels betwixt him and the Minister.

This is a base Practice, and pray do you avoid it. Never go about, by false Tales and malicious Insinuations, secretly to bring the Minister into your own Quarrel with any Man, but rather strive, all you can, to preserve a fair Understanding betwixt them, and so to manage Things that neither Side may suffer any Injury, nor have any Cause for Suspicions thereof.

Thirdly, As to your self, endeavour to live a religious, sober and innocent Life; to be civil, courteous, and inoffensive to every Body: And, in one Thing particularly, be very cautious, that is, whenever you are setting Tythe, do not drink any strong Liquors, till your Bargaining be over.

If you take my Advice, and carefully put in Practice these few Rules I have given you for your good Behaviour, you will gain the Esteem of your Master, and love of the People, and be as happy as you can reasonably desire to be in that Way of Living.

I shall say no more now, but leave you to the Practice of my old Master *Thompson's* following Directions.

I am, Dear P A D Y,

Your loving Friend,

TERENCE CAVENAGH.

A COPY of Mr. JOHN THOMPSON's Rules for viewing of Tythes.

IN computing the Value of Tythe, three Things are to be consider'd; viz. the Quantity, Quality and Price of the several Kinds of Corn, and of Hay, &c.

As for the Quality and Price, they are very obvious to any Body; but the Quantity is not so; and yet, upon this chiefly does the Proctor's Business depend for the adjusting of his Valuation.

In viewing of Land, a Man, tho' long accustomed thereto, and much more so, one unexperienced, may be liable to Mistakes.

Small Parcels of 2 or 3 Acres, whether view'd from within or without the same, may, perhaps be nearly computed: But greater Tracts, and especially irregular Ones of 10, 15 or more, not with such Certainty.

Suppose a Viewer stands in the Middle of a Square Plot of Ground, as Fig. 15th; a Side of which (to use a small Number) one may call 20 Yards long.

Suppose again, one fourth Part of the 20 Yards viz. a Line of 5 Yards long, or (which comes to the

the same Thing) an additional Space of 5 Yards broad be taken into the View on each Side this, in it's surround would make a hollow Square **A, B, C, D.**

Now the Content of the inward Plot (*O*) which each Side is 20 Yards long, would amount to 400 square Yards; for 20 multiplied by 20 makes 400.

The hollow Square round the inner Square, (*O*) consists of 8 Parts; viz. 4 long Squares made each of 20 Yards multiplied by 5 Yards, all which make 400 square Yards, and of 4 small Ones at the Corners, each of 5 Yards, multiplied by 5 Yards, all which come to an 100; and both the Sums being added make 500.

So that the hollow Square itself, tho' on each Side so narrow, as to be in Breadth but one quarter of the inward Square, exceeds the Content of (*O*) by one Quarter.

Thence one may conclude that a Proctor, tho' much Experienced in Viewing, may be often mistaken in his Judgments of the Quantities of large Pieces of Ground.

And, besides, since the Nature of Sight is such, that the apparent Magnitudes of Objects do lessen in Proportion, as their Distances do increase; Views of large Pieces of Ground, especially from the Outsides of them, may, upon that Account also, be attended with Mistakes, and so fewer Acres be returned by the Proctor, than what the Tracts view'd do really contain.

There in

There may be several other Causes assigned for Deceits of Judgment by the Sight, not necessary here to be mentioned.

But perhaps, it may not be amiss to name one which to some Persons has seemed a Cause of Mistake, to the Prejudice of the Farmer. And that is, viewing Corn when it is grown high; for then a Field (as some have thought) appears to be more than really it is: And such Persons, when they have seen the Ground bare, have wondered to find it less than what they took it for, when so covered.

And perhaps, also some Proctors, under their own Uncertainties in their Views, and to recommend themselves to their Employers, may, by Random-Guesses in their Returns, chuse rather to exceed the just Quantities than seem to lessen them; whence Disputes and Misunderstandings may, and often do arise.

Surveying, tho' perhaps one of the first Parts of Geometry the World was acquainted with, seems to be one of the lowest Branches of Mathematics; and it must be owned, that the following Method is the very meanest Kind of Surveying and yet, as the former is very necessary, this itself may perhaps appear not quite unuseful.

What in this Method is propos'd, is,

First, How to find out a Standard for Measuring

Secondly, How to use it in the Field.

Thirdly, How to cast up the Quantities or Contents of Lands measured abroad.

First, How to find out a Standard for Measuring.

First, Lay out a Line of 20 Yards long, and fix a Mark at each End of it.

Secondly, Write the Numbers, 1, 2, 3, &c. to 20 inclusive in one Column under one another; over against which draw 3 Columns more for Yards, Feet and Inches.

Thirdly, Then leisurely step over that Line, and when you get to the End of it, observe whether, in 20 Steps you measure the said 20 Yards, or, how far you fall short or exceed the same, and over against the Figure (1) enter the Number of Yards, Feet, and Inches of your Walk in the said 3 Columns. And so repeat your Walks backward and forward, till you compleat the whole Number of 20 Walks.

Fourthly, Sum up the Fractions, and whole Numbers of Inches, Feet, and Yards, in the three Columns, and divide the Sum of them by 20, (the Number of the 20 Walks) and, if the Quotient comes out 20, or under or over nearly, you may then conclude that your Steps or Paces one with another, make about one Yard a Piece, and that 20 of your Paces may be reckon'd to be equal to 20 Yards, the Standard proposed for your Practice in Measuring.

This may happen to most Men of a middling stature. But if even the middle-siz'd Man finds, that the Sum of his Paces in walking 20 Times over the 20 Yards prove to be such, as, that when divided by 20, it makes but 19, or thereabout, or makes about 21, then, in the former Case, may 19 serve for his Standard, or in the latter, 21.

The

The latter Case may more likely happen to a taller Man, and the former to one of Stature less than either of them.

But let the Number of any Man's Steps be this or that, whether 18, 19, 20, 21, or 22. for 20 Yards in one Walk with another for 20 Times made, every such particular Number may serve as a Standard for every such particular Man to measuring the 20 Yards.

And altho' not one of these several Measures be mathematically true, yet any of them, if not far from the Truth, may be sufficient for the Purpose intended thereby, which is, only to gain a moderate and tolerable Knowledge of the Lands thus measured.

The measuring by a Circumferentor, may indeed be presumed to be more exact, but is however not infallible; because a Mistake of but one sixtieth Part of a Degree in taking off any one Angle, either in Observation or Protraction, or of any one Link of the Chain in measuring any one Length of the Chain, makes the Work fall short of a mathematical Exactness; altho' such Errors and much greater Ones, may not be very visible when 20 or 30 Acres, &c. are by Protraction comprised within a small Figure, of but a few Inches in Surface. This Fallibility so frequently appears in Surveying, that few Men can truly say they have made many Perches of their Surveys mathematically exact; and yet this Art is of excellent Use, and is allowed as sufficiently answering the Ends proposed by it.

The TABLE.

Steps.	Yards.	Feet.	Inches.
1	19	2	8
2	21		
3	20		
4	19	0	9
5	20		
6	19	0	8
7	20		
8	19	2	9
9	19	2	8
10	20	1	
11	19	1	9
12	20	1	3
13	19	2	
14	19	1	9
15	20	1	
16	20	1	
17	19	2	8
18	20	1	9
19	20	0	6
20	20	1	0
	400	1	2

So that the Total is 400 Yards, 1 Foot 2 Inches.

Therefore divide 400 by 20, the Number of Walks
 20) 400 (20 Yards, for one
 400 Walk with another 20 Times over.

There is indeed, 1 Foot 2 Inches over, which is inconsiderable in 400 Yards, and needs not be accounted for.

If a more nice Exactness for the obtaining of the aforesaid Standard be thought necessary, a Line of 40, 50, or 100 Yards may be let out and paced over as often as you please, and so the Standard work'd off in the same Manner as before.

Thus, if you pace a Line of 40 Yards 40 or 50 Times over, and the Sum of all your Steps over the 40 Yards paced 40 Times over, be 1600; and the Sum of all over the same 40 Yards paced 50 Times over be 2000: Then, in the first Case, divide 1600 by 40, and in the second Case 2000 by 50; thus

Walks.	Steps.	Yards.
40)	1600	(40
	160	
—		

. o

Walks.	Steps.	Yards.
50)	2000	(40
	200	
—		

. o

That is, as in the first Case, 20 Yards by 2 Walks, made 400, and the 400 divided by 20 Walks yielded in the Quotient 20 Yards; so here, 1600 divided by 40, yields 40, and so does 2000 divided by 50 yield 40; in each of which it is plain, that you 40 Paces make 40 Yards, or each Pace one Yard.

But suppose 40 Yards paced over 50 Times make the Sum of all your Paces 1900: Then,

Walks

<i>Walks.</i>	<i>Paces.</i>
50)	1900 (38
150	
	—
	400
	—

whence it appears that you step 40 Yards in 38 Paces; that is, 20 Yards in 19 Paces, and therefore 19 Paces would serve for your Standard in measuring each 20 Yards. And, thus may the Standard be fixed for a Line of any other Number of Yards traced over by any other Number of Walks.

The Reason why Yards, and 20 of them in Number, are proposed for a Standard rather than a Perch, is, because measuring by the Perch would, in this Way, be attended with troublesome Fractions; and because working by the round Number 20, is near as easie as that by the Perch, were it not attended with Fractions at all.

The Standard for measuring being thus discovered, and fixed, The Second Thing to be shewn is now to make use of this Standard in the FIEL D.

Things necessary to be known, before you go upon Viewing and Measuring.

First, when two Lines meet in a Point, so that if continued, they would cut one another,

her, their meeting is called an Angle or Corner, as *A*, Fig. 1st.

Second, When a Plumb-line hangs down to another Line cross upon a Table, or if upon one Line on a Paper, another like the Side of a Carpenter's Square Rule stands upright, so as not to lean on either Side, then that Line is called a Perpendicular, as *D C.* upon *AB*. And the Angles on each Side, as *E F.* are equal to one another, and are called right Angles.

Third, A Figure is a Space comprehended under one Line as a Circle, or under 3 or 4 or more Lines, meeting so as to comprehend a Space, as *Fig. 3.* *A B C.*

Fourth, A Figure of 3 Sides, as *Fig. 3.* *A B C.* And 3 Angles is called a Triangle.

Fifth, An exact Square, *Fig. 4.* *A B C D.* has 4 equal Sides, a long Square, as *Fig. 5.* *A B C D.* has 2 opposite Sides only equal, but all the Sides of either at right Angles.

Sixth, A Rhomb, or Diamond Figure, has all its 4 Sides equal, but none of them Perpendiculars or at right Angles, as *Fig. 6.* *A B C D.*

Seventh, A Rhomboid, has 4 Sides, but only 2 opposite Ones equal, and none Perpendicular or at right Angles, as *Fig. 7.* *A B C D.*

Eighth, A Trapezium, has 4 Sides, of which there are many Sorts, but none of them like any of the foregoing Figures, as *Fig. 8.* *A B C D.*

Ninth, A Pentagon, is a Figure of 5 Sides, as *Fig. 9.* *A B C D E.* And so of many other right lined Figures.

Tenth,

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Tenth, To make a Rectangle or Oblong, Fig.

13.

If one Line $A\ B$, be one Foot long, and another $A\ D$. a Yard or 3 Foot, place $A\ B$. perpendicularly at A ; draw $B\ C$. equal to $A\ D$. and $D\ C$. equal to $A\ B$. and then you have a Rectangular Figure or long Square, 1 Foot broad and 3 Foot long, containing 3 square Feet.

Eleventh, So a Line of 2 Foot so placed, on a Line of 3 Foot, will make 6 square Feet, as Fig. 14. For as the Figures 2 and 3, multiplied one by the other produce 6, so the 2 Lines make a Right angled Figure, with as many Squares, each containing one Foot.

These things being known,

First, Then make a Field Book of 4 Leaves in a Sheet.

Divide the Left-Hand Page into 3 Columns, and the Right into 7, in all 10.

Draw Lines at such Distances, that the 4th Column may be an Inch and a half wide, the 5th one Inch, the 6th half an Inch, the 7th an Inch and a half, the 8th an Inch, the 9th half an Inch, and the 10th half an Inch.

The 1st. Column is for entering the Names of each Farmer or Owner of Lands.

The 2d. For the Names of each Field or Piece of Land, and the Number.

The 3d. For the Situation, bearing or bordering of each Field upon other Lands, with other Remarks necessary.

The

The 4th, is for the 2 Sides of each Square to be Survey'd, and for entering under them respectively Marks as (* * *) one for each Walk, together with the single Yards under 20, and Feet at the End of every Side walked over, which Work is to be done in the Field.

The 5th, and 6th, for the Sum of the Number of Crosses together with the single Yards, and Feet for each Side of a Square to be entered in Arithmetical Numbers of Yards and Feet at Home.

The 7th, for the 2 Lines of Triangular Figures viz. the longest Side and the Perpendicular of each under which the Number of Crosses, together with their Fractions are to be entered in the Field.

The 8th, and 9th, for Triangles, the same as the 5th and 6th Columns for Squares.

The 10th, and last Column is for the Acres. When the 2 Sides, either of a Square, or the longest Side and Perpendicular of a Triangle are multiplied by one another, and the Product or Superficies turned into Acres, the Number of them is to be entered in that last Column.

The Field Book being prepared,

Secondly, Get a Cross made of 2 flat Rulers of bout an Inch and a half broad, half an Inch thick and 16 Inches long, fixed in the middle to a true Square, that is at right Angles or Perpendicular one another, which may be done by the Square Rule of a Carpenter, as Fig. 10. A B C D.

Draw a Line through the middle of each Rule from one End to the other; at each End fix an u-

ight Sight of about 2 Inches high, with a Slit down
the Middle of each Sight.

If you have not Sights fix a Peg or Nail without
Head at the End of each Line, running through
the Middle of the Rulers.

Make a Gimlet-hole in the common Center of
the Cross, at O. and another at the Top of a
Walking-Stick, and through both thrust in a Peg,
which may hold the Cross fast upon it.

Being thus furnished both with a Field Book and a
Cross, you may go into the Field upon your View-
ing, which may best be done in the Middle of May,
or sooner; because Corn and Grass are then short
and low, and the Weather usually temperate, and
therefore the Fields may be travelled over with less
Labour and Danger.

Measuring.

If a Field be pretty Square, as Fig. 4 or 5, you
have no more to do, but to pace over 2 adjoining
sides of it, as A B, A D, and for every 20 Yards to
put down one Cross, (*) in your Field Book, till
you end one Side, and under that Side a Cross (*) for
each, till you end the other Side, and at the end of
each, as many Yards as may fall short of 20, toge-
ther with 1 or 2 Feet according as it may happen
in one or both Sides.

N. B. If your Steps be such as that you walk
over 20 Yards by 20 Steps, the Matter is very easy,
or then you must make a Cross after every 20 Steps;
but if you walk over 20 Yards, by 18, 19, 21, or
22 Steps in your Walks, one with another, then
make a Cross, (*) according to your particular Num-
ber,

ber, under or over 20 Steps for 20 Yards, and carry every Walk by such Steps, 20 Yards.

If the Figure of the Field be a Triangle, as *A C*, Fig. 3. chuse the longest Side, *A C*, in it for your first Walk; and begin either at *A* or *C*. at *A*, look through 2 Sights or along 2 Pegs of the Cross, so as in a straight Line from *A*, to view *C*, some Point of which Line as * at a Distance from *A* direct some Man to stand still.

Then begin to pace over the Line towards him and when you get within a Walk or 2 of him, the (to secure your true Direction for Walking) look through the Sights or along the Pegs backward to *A*, and forward to *C*, and in the true Line, as before, order the Man at * to remove to the Point *C*; if the Side be very long, to some other Point between you and *C*.

When you have proceeded so far as that you imagine you are pretty nearly under the Angle *B*, but are not certain whether it is exactly Perpendicular over you, take a View again through the 2 Sights backward and forward, so as to have *A* and *C* in a direct Line.

Then look through the other 2 Cross Sights toward the Angle *B* above, and if the Line through them ends in the laid Angle *B*, you are perpendicularly under it. If wide, shift backward or forward in the Line *A C*, as Occasion requires, you find your self exactly under *B*, as at *E*, Line *B E*, will be the Perpendicular Line, or second Side to be walked over. Fix the Man in the Point of the Line *A C*, till you finish it by wa-

ng to *C*, and note in your Field Book, as many Crosses as you have Walks, together with single Yards and Feet, as they may happen. Then go back to the Man, and walk over the said Perpendicular Side, as before, and put the same in Crosses under those Crosses of the first Side *A C*.

N. B. The reason why the first Walk is to be on the longest Side is, because by that Means the Perpendicular will then fall within the Triangle.

After this manner may any right Lined Triangle whatsoever, be measured to gain the superficial Content of it.

If the Field be not a Square nor a Triangle, but as 4 Sides or more, whether equal or not equal to one another, it may be reduced into Triangles, and those as many, bating 2, Triangles as it has Sides in Number. And this is done by drawing one or more Lines (as the Figure may require) crois from one Angle to its opposite Angle.

N. B. That what right lined Figure soever you have, it may be brought thus into as many Triangles bating 2 Triangles, as it has Sides. Thus a square, as *A B C D*, Fig. 4. which has 4 Sides, may have 2 Triangles, as *A B C*, and *A D C*. so a Rhomb Fig. 6. A Rhomboid Fig. 7. and a Trapezium Fig. 8. In each of which as before, trace over the Cross Line *A C*; and since there are 2 Perpendiculars *B E*, *D E*, which fall upon the same line *A C*, secure first the Point of one, and then the other in the same manner as before, Fig. 3; and when the Line *A C*, is finished, trace both the Perpendiculars also, and enter them in the Field Book.

N. B.

N. B. That wherever 2 Perpendiculars fall upon the same Line, once walking over it, will be sufficient, tho' the said Line must be twice entered in the Field Book to avoid Mistakes, because it must be work'd together with each Perpendicular.

There may happen to be Figures of more Sides than 4. but all these are to be divided by crois Lines as before into as many Triangles, bating 2, as there are Sides. As the Pentagon or Figure of 5 Sides whether equal or unequal has 3 Triangles, that is less in Number by 2 (as before) than 5 the Number of its Sides. And in each Triangle, the longest Side is to be multiplied by its correspondent Perpendicular, as thus, *Fig. 9.* $B D$ by $C E$, $A D$ by $B E$, and $A D$ by $F E$. And this may be done in any other Figure, whatever Number of Sides it consists of.

From what has been said, mix'd Figures may be adjusted as *Fig. 11*, and any other sort of right lined Figures may be ordered for measuring, and worked off accordingly.

But further; there may happen to be a Field of one Side or other to be walked over, which is indented with small Angles inwardly or outwardly, as *Fig. 12.*

In this case the Way will be to take a Streight Line as $A B$ throughout crois the Middle of them by which as much is gain'd as is lost, and therefore it may serve as well as if streight; then, instead of crossing over by that middle Line, you may walk within the Angles in a Line parallel, that is, equally distant at both Ends, from the Side crossing the Angles. $A B$ is the cross Line, and $a b$ the inward Parallel to be walked over.

N.

N. B. That b , is to be taken in the next Line walked, if it is the Side of a Square, or is a Perpendicular.

This Management for Angles inward and outward is often the Case and Practice among Surveyors, even with their Instruments.

Lastly, there may sometimes be a Field somewhat circular or oval, or at one End such, and at the other End Square. In these and other perplexed Cases (which rarely happen) there may be greater Difficulties, and yet from what has been said, some sort of Mensuration may be determined and perform'd so, as that a tolerable Knowledge of the proper Lines may be acquired.

Having done what was necessary in the Field, the Third Thing remaining is to shew how at home to find the superficial Quantities or Contents of Lands thus measured; and

First, For the Lines of Square Figures.

First, Look into the Field Book at the Field called the Leys, and numbered (A); over against which on the right hand Page in Column the 4th, you find for the first Side of the Square 10 Crosses, 3 Yards and 1 Foot, thus ***** 3 Yards 1 Foot.

Turn these into Arithmetical Numbers. Now 10 Score, 3 Yards and 1 Foot will amount to 20; Yards 1 Foot. Enter these in the 5th and 6th Columns. The second Side has four Crosses, 4 Yards and 2 Feet, as **** 4 Yards 2 Feet, enter these under the former in the same Manner. Draw a Line under each 2 Sides or Sums. And so go on through

through all the rest of the Lands noted in the Field Book.

Secondly, For the Lines of Triangles.

The 2 Lines of Triangles, *viz.* the longest Side (or Base) and the Perpendicular which falls upon it, and which in the 7th Column you find noted with Crosses * * * &c. as before, are to be entered in the 8th and 9th Columns assigned for Triangles, after the same Manner, and so throughout all the rest of the Sides for Triangles.

N. B. That in this Method, tho' at the End of each Number of Crosses, any Number of single Yards under 20, may happen to be added, yet, you never can have above 2 Feet, because 3 Feet would make 1 Yard and so pass into the Denomination of Yards.

How to bring each 2 of these Lines into a Superficies or Plane.

To do this you are to multiply the Sum of one Side by the other in Columns 5th and 6th, to Square Fields, and in Columns 8th and 9th, for Triangles.

Now amongst Workmen as Carpenters, Glaziers &c. there is a Way for casting up the superficial Contents of their Work, which they find much more easy and expeditious than any other, and that is, what they call Cross-multiplication.

As for example, A Glazier has work'd up 3 Foot 6 Inches of Glass long, and 2 Foot 5 Inches broad he puts down,

Ft. In.

3 X 6 which he works thus
2 X 5

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18, 6 Inches by 2 Foot, or (which is the same) 2 Foot by 6 Inches make 12 Inches, not 12 small Square Inches, but 12 Inches each one Foot or 12 Inches long, and one Inch broad.

Now 12 such long Inches being equal to one Square Foot, he enters this Product under the Denomination of Feet.

2dly, 3 Foot by 2 Foot, make 6 whole Square Feet.

3dly, 3 Foot by 5 Inches make 15 long Inches or one Square Foot and 3 such Inches over.

4thly, 6 Inches by 5 Inches make 30 small Square Inches. But in 30, at 12 such small Inches to a long Inch, there are 2 long Inches, of one Inch broad, and a Foot long, and also 6 small Square Inches over and above, which are called only parts of the long Inch, and therefore placed in a third Column.

Operation.

Ft.	In.
3	X 6
2	X 5
	—
1	- 0
6	- 0
1	- 3
	2 - 6
	—
8	- 5 - 6

Add the four Members and the Total is 8 Feet,
Inches, and 6 Parts.

This Cross Multiplication may be very proper in
the Method here proposed; the Manner being the
same, with this Difference only, that instead of Feet
and Inches, the Denominations here will be Yard
and Feet; As for Example, take the Numbers afore-
said out of the Field Book, *viz.*

Yards.	Foot.
203	X 1
84	X 2

Multiply the upper Sum by the lower, thus, 1/
1 Foot by 84 Yards, or (which is the same) 84 Yard
by 1 Foot makes 84 Feet.

Now the Question is what is here meant by 8.
Feet. The Answer is, that, since when a Line of
one Yard (or 3 Feet) is drawn into (that is multi-
plied by) a Line of one Foot, the oblong Square
thence is indeed one Foot broad, but then it is a Yard
long, and really in Quantity 3 Square Feet, as Fig
13; and thus it is when instead of 1 Yard, you hav
as here 84 Yards to be multiplied by one Foot
Therefore here 84 Yards long by 1 Foot become
an oblong Square of 84 Feet each of one Foot broad
but a Yard or 3 Feet long. Now since there are
square Feet in a Yard, that is 3 Feet broad and three
Feet long, there will be in 1 Yard 3 such Feet as her
mentioned; that is 3 of one Foot broad and three

Feet long, and therefore these 84 Feet are indeed
but 84 Thirds of a Yard.

If then you divide this 84 by 3, you will get the
Number of square Yards contained therein, thus,

3) 84 (28 Square Yards

6

—

24

24

—

..

2d. Step 203 Yards
by 2 Foot

—

make 406 Feet, that is 406 Feet, each
of one Foot broad and a Yard
or 3 Feet long, and this Number also for the same
Reason as above is to be divided by 3 to reduce it to
square Yards. Thus,

3) 406 (135 $\frac{1}{3}$ Yards

3

—

10

9

—

16

15

—

1

The

[27]
The $\frac{1}{3}$ of a Yard after the Quotient 135, being but
3 square Feet may be thrown out of the Account as
an inconsiderable Quantity in this Business.

3d. Step 203 Yards
by 84 Yards

—
812 —
1624
—

make 17052 whole square Yards

Add all these 3 Members together 28
135
17052
—

The Total in whole square Yards 17215

But here it may be asked *First*, why Yards and Feet only are here made use of, whereas, there may be Inches also from 1 to 11 inclusive, according as they happen, and these may produce, perhaps, a considerable Quantity in the whole.

Secondly, It may be asked why there are but 3 Operations or Branches, whereas there ought to be four that is, the Multiplication of the 1 Foot by 2 Foot is left out also.

To the 1st. it may be answered thus, suppose you have

Yards. Feet. Inches.

400 - 1 - 10

To be multiplied by 400. - 2 - 10

Now this, if worked, would come to above 20 Acres, which make a pretty large Field, and yet the Produce of Inches therein, tho' as high almost as they can be, would be but about 224 square Yards, which would amount to no more than about one 34th. Part of an Acre, tho' the Numbers 400 to be multiplied thereby be so large.

Therefore Inches multiplied by Yards, and much more so, by Feet and Inches, affording so small a Quantity, may be thrown out as inconsiderable in this course Kind of Survey.

To the 2d. it is to be answered, that since the highest you can have in Feet to be multiplied is 2 by , which would make but 4 Feet and not half a square Yard, tho' you ought to multiply Yards by feet, yet you need not multiply Feet by Feet.

Hence, whereas if you multiplied Yards, Feet and Inches, by Yards, Feet and Inches, you would have 9 Branches or Members in each such Multiplication, by leaving out Inches, which as aforesaid are of no great Moment, you save the Trouble of of the 9, and by omitting also the Multiplication of Feet by Feet, you save another, so that you have only 3 Steps of Multiplication instead of 9, which renders the Work expeditious as well as easy.

But

But if the Viewer will chuse to be more exact, and will not lose the Produce of Inches above 6 Inches, let him at the End of the last Crois in his Walk reckon one full Foot for each such Number of Inches; and put it to the Place of Feet, where if there be (O) this will make 1, if already 1 Foot, this will make 2, if 2 it will make 3 Feet, and then one Yard is for thole 3 Feet, to be added to the single Yards.

If the Viewer meets 6 Inches or any other Number less than 6, let him quite leave them out of his Reckoning. And so, in the former Case, he may make an Abatement in the Product after the Multiplication; and, in the latter, some Addition according to his Judgment proportionably in each.

To Reduce the Product of any Number multiplied by another into Acres.

First, The square Figure.

Secondly, The Triangular one.

First, The square Figure.

It is to be noted there are 2 Sorts of Acres used in different Parts of *Ireland*, the *Irish* and *English* one. The *Irish* Acre is formed upon the Perch or Pole of 21 Feet or 7 Yards long, which being squared make 49 square Yards, and 49 square Yards multiplied by 160. the Number of square Perches in an Acre makes 7840 square Yards in a square Acre. The *English* Acre is form'd of the Perch or Pole of 16 Feet or 5 Yards and a half, which being squared make 30 square Yards and a Quarter, and 30 $\frac{1}{4}$ multiplied by 160, make 4840: Therefore 7840 is

ix'd, or standing Divisor for the *Irish Acre*, and
4840 for the *English*.

Now if you are to reduce any Number or Product in the Field Book into Acres; as for Example, the same Number you had before taken out of the same, viz. 17215 Yards.

To find the *Irish Acre* divide by

Yards.

$$\begin{array}{r} 7840) 17052 (2 & 1372 \\ \underline{15680} & \underline{\quad\quad\quad} \\ \hline & 7840 \\ & 1372 \end{array}$$

That is, 2 Acres and about a sixth Part of an Acre.

Again, 7840) 156800 (20 Acres *Irish*

15680

o

To

To find the Content in *English Acres*,

$$\begin{array}{r} 4840) 17052 (3 \quad 2532 \\ \underline{14520} \qquad \qquad \underline{\quad} \\ \underline{\quad} \qquad \qquad 4840 \\ 2532 \end{array}$$

That is 3 Acres and above one half.

$$\begin{array}{r} 4840) 156800 (32 \quad 1920 \\ \underline{14520} \qquad \qquad \underline{\quad} \\ \underline{\quad} \qquad \qquad 4840 \\ 11600 \\ 9680 \\ \underline{\quad} \\ 1920 \end{array}$$

That is 32 *English Acres* and above a third Part.

Hen

Hence the Proportion of the Quantity of an *Irish* Acre to that of an *English* one, is nearly as 8 to 5.

When you have gained the Number of Acres in each Product as above, enter them in the 2oth. and last Column of Acres in the Field Book.

As for the Product of any Triangular Lines, that is the long Side (or Base) and the Perpendicular you must divide it by two, and take only one half of the whole, and then divide by 7840 for *Irish*, and 4840 for *English* Acres.

The Reason why you are to take but one half of the Sum is as follows,

In a Square *ABCD*. Fig. 5. 2 Triangles made by a cross Line from any one Angle to its opposite one, are equal to one another, as *ADC*. and *ABC*. and each of them equal to half the Square. If then of one Triangle *ACD*. you take the Base *AD*. and multiply it all by the Perpendicular *DC*, it will make the whole Square: But if you take half the Perpendicular *DC*. viz. *DF*. and multiply it by the whole Base *AD*. it will make the Oblong, *ADFF*.

But if you take half the Base *AD*. as *AH*. and the whole Perpendicular *AB*. or *CD*, it will make the Oblong *AHaB*: now this, and the former Oblong *ADFF*. are each of them halves of the whole Square as well as the Triangles are, and therefore equal to the Triangles, and to one another. Therefore a Triangle being but half the Product of its Base multiplied by

The FIELD BOOK.

I	2	3
Names of Farmers.	Names of Lands, Corn, &c. and Number.	Bearings.
John Flood.	4 The Leys.	North of Porters Town.

Squ
Si

1 ft.

**

**

Yds.

3

2 d.

**

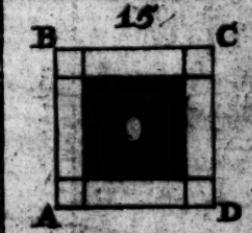
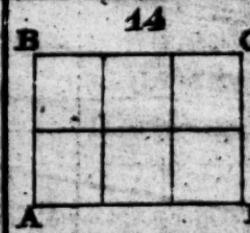
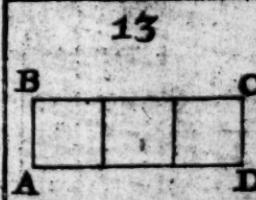
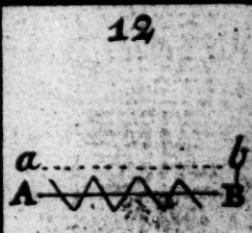
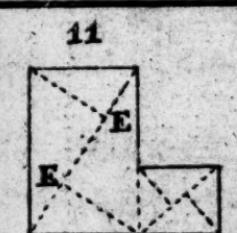
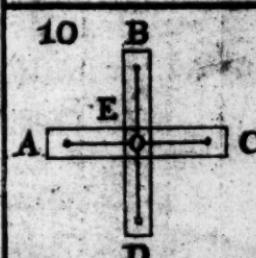
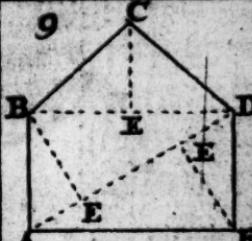
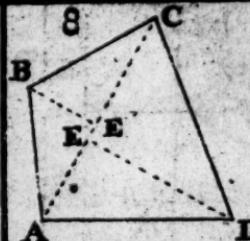
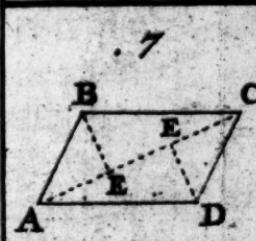
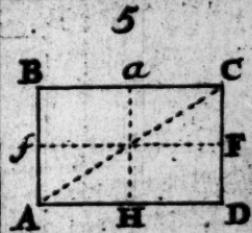
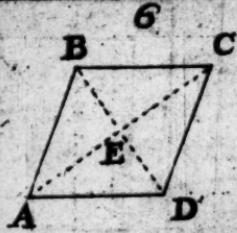
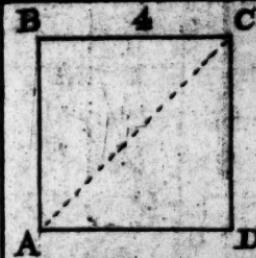
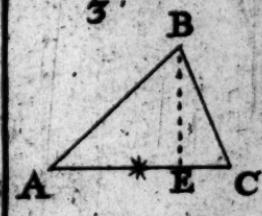
Yds.

4

4	5	6	7	8	9	10
Square Sides.	Yards. Feet.	Triangulars	Yards. Feet.	Acres.		
1st. Side. ***** ***** Yds. Ft. 3 1	203	I Long Side and Per- pendicular.	Long Side. ***** Perpendicu- lar ***			
2d. Side. ***** Yds. Ft. 4 2	84	2				



Fig^r 1





by the Perpendicular, you are to take but the half of the Product.

The Conclusion.

What was proposed in this Essay is now done and it is hoped, that the Method being laid down as plain as a Thing of this Nature could well be, and made pretty obvious to the meanest Capacity, it may be of some Use to the Young Proctor.

There seems not to be any one Thing of the least Difficulty in the whole Scheme, except that of the Cross-multiplication, and the Division after it; and yet, these also have been so explained, that any Man who has but a moderate Knowledge of Arithmetick (of which few Proctors are to be supposed ignorant) may, by a little Application, clearly understand the Matter.

But if he of himself cannot easily conquer it, his Minister, by whom he is employed, may soon instruct him.

This Method of viewing is not a fantastic or unpracticable Scheme. It has, in many instances, been practis'd with good Success; and if any Man of tolerable Sense and Industry, together with so much Arithmetick as is mentioned, does but carefull work upon the Directions advanced therein, it is not to be doubted, but that he will meet with the like Advantage.

Perhaps it may be urged that the Work throughout one or more Parishes, by this Method, would be laborious and tedious.

No doubt it would cost some Pains, tho' perhaps not much more than a careful Proctor ought to take in his viewing and walking over the Fields in the usual Way; but then, tho' it should cost some more Labour, the Proctor would be well rewarded for his Trouble.

And tho' it were not to be thoroughly done in one Year, it may in two or three. And yet, I can truly say it, I knew a Man, who, by his Industry, worked over five or six Parishes in as many Days.

And here is one particular Advantage, that whatever Lands (especially lasting Inclosures) are thus viewed, may serve, as to the Quantity, for perhaps twenty Years, or during Life afterwards; one careful Survey this Way being to be kept as a standing Register to futurity.

I should not much blame a Proctor, if he does not anxiously measure every small Plot of 2 or 3 Acres according to this Method; but then, for larger Plots or Fields, I would not have him too much depend upon Random-Conjectures made only from Sight.

If this Method may (as new Schemes generally do) seem odd, and therefore some Proctors will reject it, they may do as they please; or, if they think fit, they may join their usual Method of viewing and this together; for this will not hinder them in that, but rather help them: But it is presumed, that, let them be ever so well experienced and skilful in the common Way, they will not be able, by viewing alone, to gain the Contents of a Field thereby with so much Certainty.

